WHAT IS CLAIMED IS:

1. A power module in which a heat generating component connected electrically to a wiring substrate is connected to a heat sink through the medium of a thermally conductive and electrically insulating member,

wherein the thermally conductive and electrically insulating member is a curable composition containing (A) a thermosetting resin, (B) a thermoplastic resin, (C) a latent curing agent, and (D) an inorganic filler; and

the thermally conductive and electrically insulating member is bonded to the heat generating component in a complementary state to unevenness in shape and height of the heat generating component, and heat generated from the heat generating component is radiated by means of the heat sink.

2. The power module according to claim 1,

wherein with respect to a total amount of 100 parts by mass of a combination of (A) the thermosetting resin of not less than 50 parts and not more than 95 parts and (C) the latent curing agent of not less than 5 parts and not more than 50 parts, (B) the thermoplastic resin is contained in an amount of not less than 10 parts and not more than 100 parts; and

with respect to a total amount of not less than 5 parts by mass and not more than 30 parts by mass of a combination of (A) the thermosetting resin, (B) the thermoplastic resin, and (C) the latent curing agent, (D) the inorganic filler is contained in an amount of not less than 70 parts and not more than 95 parts.

3. The power module according to claim 1, wherein the thermosetting resin is in a liquid state at room temperature, and the thermoplastic resin is in a powdery state when the thermosetting resin is in an uncured state.

4. The power module according to claim 3, wherein the thermosetting resin that is in the liquid state at room temperature is a liquid epoxy resin.

5. The power module according to claim 1, wherein the curable composition containing (A) the thermosetting resin, (B) the thermoplastic resin, (C) the latent curing agent, and (D) the inorganic filler has a property

that the viscosity increases steeply in two stages represented by: a first viscosity increasing curve with respect to temperatures equal to or higher than 70°C and lower than 130°C; and a second viscosity increasing curve with respect to temperatures equal to or higher than 130°C.

6. The power module according to claim 1, wherein the thermally conductive and electrically insulating member is bonded to a plurality of the heat generating components.

7. The power module according to claim 1 or 2, wherein a non-heat generating component further is mounted on the wiring substrate.

8. The power module according to claim 6, wherein the heat generating component is mounted on one main surface of the wiring substrate, and the non-heat generating component is mounted on a surface opposite the one main surface.

9. The power module according to claim 1, wherein the inorganic filler is at least one selected from the group consisting of Al_2O_3, MgO, BN, SiO_2, SiC, Si_3N_4, and AlN.

10. The power module according to claim 1, wherein the thermally conductive and electrically insulating member has a thermal conductivity of 1 to 10 W/mK.

11. The power module according to claim 1, wherein the heat generating component is at least one semiconductor element.

12. The power module according to claim 11, wherein in the at least one semiconductor element, a heat spreader is provided on a surface opposite a surface connected electrically to the wiring substrate, which is encapsulated with resin in a state where at least a portion of the heat spreader is exposed, and an exposed surface of the heat spreader is bonded to the thermally conductive and electrically insulating member.

13. The power module according to claim 11, wherein the semiconductor element is a semiconductor chip mounted facedown on the

wiring substrate, and a rear surface of the semiconductor chip is bonded to the thermally conductive and electrically insulating member.

14. The power module according to claim 11, wherein the semiconductor element is a semiconductor chip mounted facedown on the wiring substrate, and a rear electrode of the semiconductor chip is connected electrically to the wiring substrate through the medium of a metallic conductor.

15. The power module according to claim 14, wherein a portion between the semiconductor chip mounted facedown and the wiring substrate is encapsulated with resin.

16. The power module according to claim 11, wherein the semiconductor chip is at least one selected from a silicon semiconductor and a silicon carbide semiconductor that have a configuration in which an electric current flows in a thickness direction.

17. The power module according to claim 1, wherein the heat sink is made of aluminum or copper.

18. The power module according to claim 1, wherein the heat sink is fixed to the wiring substrate using a fixing tool.

19. The power module according to claim 1, wherein the heat sink includes a concave portion, and at least the heat generating component is housed in the concave portion through the medium of the thermally conductive and electrically insulating member.

20. The power module according to claim 1, wherein the heat sink is provided with a radiating fin.

21. The power module according to claim 1, wherein the heat generating component is composed of a plurality of heat generating components varying in height.

22. The power module according to claim 1, wherein the thermally

conductive and electrically insulating member is brought to the complementary state by being subjected to pressure.

23. A method of manufacturing a power module, comprising the steps of:

mounting electronic components including at least a heat generating component on a wiring substrate;

forming a curable composition layer containing (A) a thermosetting resin, (B) a thermoplastic resin, (C) a latent curing agent, and (D) an inorganic filler between a heat sink and the wiring substrate on a side of the heat generating component and pressing at least one of the heat sink and the wiring substrate against the other so that a thermally conductive and electrically insulating member is bonded in such a manner as to be deformed complementarily to unevenness in shape and height of the heat generating component; and

forming the thermally conductive and electrically insulating member by allowing the curable composition layer to be cured by heating.

24. The method of manufacturing a power module according to claim 23,

wherein with respect to a total amount of 100 parts by mass of a combination of (A) the thermosetting resin of not less than 50 parts and not more than 95 parts and (C) the latent curing agent of not less than 5 parts and not more than 50 parts, (B) the thermoplastic resin is contained in an amount of not less than 10 parts and not more than 100 parts; and

with respect to a total amount of not less than 5 parts by mass and not more than 30 parts by mass of a combination of (A) the thermosetting resin, (B) the thermoplastic resin, and (C) the latent curing agent, (D) the inorganic filler is contained in an amount of not less than 70 parts and not more than 95 parts.

25. The method of manufacturing a power module according to claim 23, wherein the thermosetting resin is in a liquid state at room temperature, and the thermoplastic resin is in a powdery state when the thermosetting resin is in an uncured state.

26. The method of manufacturing a power module according to claim 25,

wherein the thermosetting resin that is in the liquid state at room temperature is a liquid epoxy resin.

27. The method of manufacturing a power module according to claim 23, wherein the curable composition containing (A) the thermosetting resin, (B) the thermoplastic resin, (C) the latent curing agent, and (D) the inorganic filler has a property that the viscosity increases steeply in two stages represented by: a first viscosity increasing curve with respect to temperatures equal to or higher than 70°C and lower than 130°C; and a second viscosity increasing curve with respect to temperatures equal to or higher than 130°C.

28. The method of manufacturing a power module according to claim 27, wherein the first viscosity increasing curve represents a viscosity increase resulting from the thermoplastic resin powder being swelled by absorbing the liquid component by heating.

29. The method of manufacturing a power module according to claim 23, wherein the curable composition layer is solidified at a temperature equal to or higher than 70°C and lower than 130°C and cured at a temperature equal to or higher than 130°C and equal to or lower than 260°C.

30. The method of manufacturing a power module according to claim 23, wherein the step of mounting the heat generating component on the wiring substrate is a step in which, after a semiconductor chip is mounted facedown, an encapsulating resin is injected between a wiring pattern on the wiring substrate and the semiconductor chip and cured.

31. The method of manufacturing a power module according to claim 23, wherein the curable composition is at least one selected from a paste-like material and a sheet-like material.

32. The method of manufacturing a power module according to claim 23, wherein bonding of the heat sink and the wiring substrate is performed under a pressure of not less than 0.1 Mpa and not more than 200 Mpa.

33. The method of manufacturing a power module according to claim 23,

wherein the curable composition layer is cured by heating under a pressure of not less than 0.1 Mpa and not more than 200 Mpa.

34. The method of manufacturing a power module according to claim 23, wherein after bonding of the heat sink and the wiring substrate, a formed body is subjected to an atmosphere of a reduced pressure.

35. A power module, comprising:

metallic balls provided on a surface of a semiconductor chip;

a wiring substrate provided on the metallic balls; and

a heat spreader provided closely on an entire rear surface of the semiconductor chip so that heat is radiated from a side of the heat spreader,

wherein an electric current flows in a thickness direction of the semiconductor chip;

an extraction electrode for electrically connecting the heat spreader to the wiring substrate further is provided; and

the semiconductor chip, the metallic balls on the surface of the semiconductor chip, and the extraction electrode that are interposed between the wiring substrate and the heat spreader are encapsulated with resin.

36. The power module according to claim 35,

wherein on an outer side of the heat spreader, a heat sink further is connected through the medium of a thermally conductive and electrically insulating member;

the thermally conductive and electrically insulating member is a curable composition containing (A) a thermosetting resin, (B) a thermoplastic resin, (C) a latent curing agent, and (D) an inorganic filler; and

heat generated from the semiconductor chip is radiated by means of the heat sink.

37. The power module according to claim 36,

wherein with respect to a total amount of 100 parts by mass of a combination of (A) the thermosetting resin of not less than 50 parts and not more than 95 parts and (C) the latent curing agent of not less than 5 parts and not more than 50 parts, (B) the thermoplastic resin is contained in an

amount of not less than 10 parts and not more than 100 parts; and

with respect to a total amount of not less than 5 parts by mass and not more than 30 parts by mass of a combination of (A) the thermosetting resin, (B) the thermoplastic resin, and (C) the latent curing agent, (D) the inorganic filler is contained in an amount of not less than 70 parts and not more than 95 parts.